

## REMARKS

Reconsideration and the timely allowance of the pending claims, in view of the following remarks, are respectfully requested.

In the Office Action of May 18, 2006, the Examiner rejected claim 3, under 35 U.S.C. §112, ¶2, as allegedly containing indefinite terms; and rejected claims 1 and 3-6, under 35 U.S.C. §103(a), as allegedly being unpatentable over Furuya '207 (Japanese Unexamined Patent Application No. 2001-44207) in view of Suizu '973 (U.S. Patent No. 5,279,973).

By this Amendment, claims 1, 3, and 6 have been amended to provide a clearer presentation of the claimed subject matter and have amended the Specification to correct a minor informality. Applicants submit that no new matter has been introduced. By virtue of the changes to claim 3, Applicants respectfully request the immediate withdrawal of the §112, ¶2 rejections of claim 3.

Applicants respectfully traverse the rejections, under §103(a), for the following reasons:

### I. Prior Art Rejections Under §103(a).

As indicated above, amended claim 1 positively recites, *inter alia*, performing a thermal processing operation in which a thermal annealing operation is performed for 1 to 30 seconds time in an atmospheric gas that is formed by a hydrogen gas, an inert gas, or a mixture of these gases in a temperature of 600 °C to 950 °C. Such features are amply supported by the embodiments disclosed in the written description.

For example, the embodiments of the written description provide that an object of the present invention is to improve surface quality of a silicon single crystal wafer. As such, the present invention provides optimum ranges in the rapid thermal annealing (RTA) method, (e.g., 600 to 950°C of thermal treatment temperature and 1 to 300 seconds of thermal treatment time).

In contrast to the Examiner's assertions, none of the applied references, whether taken alone or in reasonable combination, teach each and every element of claim 1, including the features identified above. In particular, the Furuya '207 reference discloses an intrinsic

gettering (TO) method for removing metal impurities that reduce thermal treatment sessions. Furuya '207 teaches that Oxidation induced Stacking Fault (OSF) in an entire wafer area can be controlled within a desirable range. Furuya '207 also teaches that, after being cut from an ingot, the wafer is ground and polished. Furuya '207 further teaches the use of a pulling-speed profile defined by defect area (*e.g.*, void area and imperfect area) and perfect area. (Furuya '207: paragraphs [0008] to [0014]).

The Examiner admitted that Furuya '207 fails to teach the use of hydrogen or a mixture in rapid thermal annealing processes and, therefore, relied on Suizu '973. However, Applicants submit that Suizu '973 fails to cure the deficiencies of Furuya '207 identified above. That is, the semi-conductor manufacturing method Suizu '973 is directed to stabilizing resistance at a front surface of a substrate, which may affect wafer quality. Suizu '973 specifically teaches the use of oxygen gas during the RTA process as the method endeavors to prevent spontaneous oxide film from disappearing. In other words, the Suizu '973 method adds a slight amount of oxygen gas to the inert gas used in the thermal treatment to take into account the fact that the SiO<sub>2</sub> forming the substrate evaporates and the substrate may be damaged if the spontaneous oxide film formed on a semiconductor device disappears during the thermal treatment process.

However, Applicants submits that by virtue of the claimed features, voids on the wafer surface are eliminated by removing the oxide film on the wafer, so that silicon atoms can move on the wafer surface (See, Originally-filed English Specification: page 12, lines 11-23). As such, there is nothing in Suizu '973 that teaches the combination of features required by claim 1.

Moreover, Applicants direct the Examiner to the unexpected, non-obvious results of the claimed features, as provided by the embodiments of the written description. (*See, e.g.*, page 12, line 24-page 13, line 5).

For at least these reasons, Applicants submit that none of the asserted references, whether taken alone or in reasonable combination, teach each and every element of claim 1. In addition, because claims 3-6 depend from claim 1, claims 3-6 are patentable at least by virtue of dependency as well as for their additional recitations. Accordingly, the immediate withdrawal of the prior art rejection of claims 1 and 3-6 is respectfully requested.

II. Conclusion.

All matters having been addressed and in view of the foregoing, Applicants respectfully request the entry of this Amendment, the Examiner's reconsideration of this application, and the immediate allowance of all pending claims.

Applicant's Counsel remains ready to assist the Examiner in any way to facilitate and expedite the prosecution of this matter. If any point remains in issue in which the Examiner feels may be best resolved through a personal or telephone interview, please contact the Undersigned at the telephone number listed below.

Please charge any fees associated with the submission of this paper to Deposit Account Number **03-3975**. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

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